

view of Lifschitz (US 3,698,079). Claims 34-36 and 51-53 have been rejected under 35 USC § 103(a) as allegedly being unpatentable over Margrain in view of W. Angele as applied to claims 33 and 50, and further in view of Karol (US 3,650,021). Claims 38 and 55 have been rejected under 35 USC § 103(a) as allegedly being unpatentable over Margrain in view of W. Angele as applied to claims 30 and 47, and further in view of Toshiba (JP 05328678A). Claims 43-46 and 60-63 have been rejected under 35 USC § 103(a) as allegedly being unpatentable over Margrain in view of W. Angele as applied to claims 30 and 47, and further in view of Kliman (US 5,793,138). These rejections are respectfully traversed.

Applicants disclose a novel and unobvious high efficiency coreless armature for electromotive applications. The coreless armature is constructed with a pair of concentric conductive sheet metal windings separated by a thin insulator, such as glass fiber strands wrapped around the inner winding. The thin insulator replaces the substrate used in conventional printed circuit applications. To provide the structural support for motor applications, the armature is encapsulated in a homogeneous or non-layered material that extends through the windings. Claim 30 recites winding portions “encapsulated in a *homogeneous* material” that extends through the windings, and claim 47 recites winding portions “encapsulated in a *non-layered* material” that extends through the windings

The Patent Office relies primarily on Margrain in support of the rejections. According to the Patent Office, Margrain discloses an armature formed from a pair of encapsulated concentric conductive sheet metal windings. However, as correctly noted by the Patent Office, the encapsulation material does not penetrate the windings. Instead, the Patent Office contends that this feature is found in Angele and that it would have been obvious to one having ordinary skill in the art to encapsulate the windings disclosed by Margrain in the manner taught by Angele. As contended by the Patent Office in a telephone interview on March 3, 2003, one skilled in the art would be motivated to print the electrical conductors of Margrain on the insulating base of Angele. The insulating base could be an epoxy material, which together with an epoxy adhesive applied between the electrical conductors, results in a *layered* composition of encapsulation material extending through the armature. Applicants do not agree that the combination of Margrain and Angele render Applicants’ approach unpatentable because each independent claim requires a *homogeneous* or *non-layered* material that extends through the windings.

The Patent Office does not dispute that the proposed combination of Margrain and Angele is devoid of teaching to an armature with a *homogeneous* or *non-layered* encapsulation material extending through the windings. Instead, the Patent Office summarily dismisses this express requirement as inconsequential. In support of its position, the Patent Office relies on *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893) for the proposition that “forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art.” Applicants respectfully disagree with the Patent Office’s application of *Howard*. While, as a general rule, it is not invention to make in one piece what had previously been made in multiple pieces, where the article produced is novel, useful, and not anticipated by the prior art, it should be regarded as involving the element of invention. *In re Hubbell*, 164 F.2d 700, 704 (CCPA 1947).

[T]here is no per se rule that making something in one piece that was formerly made in two or more pieces renders it obvious. Rather, the Court must look beyond the mere fact of unitary construction to determine what improvement results from the one piece construction and whether the improvement or construction itself was obvious from the prior art.

Mooney v. Brunswick Corp., 489 F. Supp. 544, 561 (ED Wis. 1980). See also, *Krementz v. S. Cottle Co.*, 148 U.S. 556 (1893) (finding a unitary collar button to be a noticeable improvement over a conventional multipiece collar button, and therefore, patentable); *Stuber v. Central Brass and Stamping Co.*, 224 F. 712 (7th Cir. 1915) (finding a one-piece hose coupler to have a number of improvements over a two-piece hose coupler, and therefore, patentable); *Deknatel, Inc. v. Bentley Sales, Inc.*, 173 USPQ 129 (C.D. Cal. 1971) (finding a one piece underwater drainage apparatus patentable over the prior two piece art based on the many improvements found in the one piece construction).

Angele discloses a convention printed circuit armature wherein electrical conductors are etched onto an insulating base and the gaps between the etched conductors are filled with an adhesive. This etching process is achieved by coating the base with a conductive material, placing a mask over the conductive material, and etching away the portions of the conductive material exposed by the mask to form the conductors. Unfortunately, the etching process penetrates the conductive material in an omni-direction fashion, eating away at the conductive material under the mask as it makes its way downward towards the insulating base. As a result, the conductor width is decreased in direct proportion to the depth or thickness of the conductive

material. Reduced conductor width increases the resistance of the armature, thereby causing undesirable heating of the motor and energy dissipation.

Applicants' armature construction constitutes a significant improvement over the multi-layered armature configuration taught by Angele. Applicants' armature is made from a *homogeneous* or *non-layered* material that encapsulates the electrical conductors. With this structure, the width of electrical conductors can be preserved because they are not limited to an etching process from one side. Instead, they may be cut from a conductive sheet in any manner, including an etching process performed from both sides of the sheet. By etching a conductive sheet from both sides, the depth of the etch from each side can be reduced. In fact, the etch from each side needs only to penetrate the sheet to a depth equal to one-half its thickness. As a result, significant conductor width can be saved leading to a higher concentration of electrical conductor in the armature, lower armature resistance, and higher efficiency. Filed concurrently herewith is a declaration by one of the inventors under CFR § 1.132 as evidentiary support for these improvements. Based on this declaration, the Patent Office must consider the differences between Applicants' homogeneous or non-layered encapsulation construction, and the multi-layered armature of Margrain and Angele.

It is significant to note that none of the art of record discloses a homogeneous or non-layered encapsulation material that penetrates the windings of the armature. Equally important is the fact that the Patent Office has failed to cite any art that teaches how an armature with a homogeneous or non-layered encapsulation would be made. Applicants submit that they were the first to recognize that a homogeneous or non-layered material could be used to encapsulate the windings of the armature, thereby increasing the electrical conductor concentration of the as compared to conventional printed circuit techniques. It is submitted that had Applicants' approach in fact been obvious, those skilled in the art would have long since employed it. The fact of the matter is that conventional printed circuit technology has been used for a number of years, and there has been a long-felt need for a more efficient approach. Applicants have satisfied this need with a homogeneous or non-layered structure that allows more conductor material to be packed into the armature providing a significant improvement over the layered printed circuit armatures of the past. Accordingly, Applicants submit that claims 30 and 47 are allowable in view of the art of record.

